UNITED STATES PATENT OFFICE.

ALEXANDER MILES, OF DULUTH, MINNESOTA.

ELEVATOR.

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To all whom it may concern:

Be it known that I, ALEXANDER MILES, a citizen of the United States, residing at Duluth, in the county of St. Louis and State of Minnesota, have invented certain new and useful Improvements in Elevators, of which the following is a specification.

My invention relates to mechanisms for closing the openings to the shafts of passenger and freight elevators and for operating the doors of the elevator-cages.

The objects of the invention are, first, to provide mechanism operating automatically to close the shaft-openings above and below the elevator-cage, and so preclude the possibility of danger by reason of such openings being left unclosed through negligence; and, second, devices operating automatically by the movement of the cage to open and close the cage-doors when set by an operator to be in engagement at any desired floor. The first of these objects is accomplished by means of a flexible belt having its ends attached to the cage and running over drums at the top and bottom of the shaft, and the second by means of levers pivoted to the cage, having one of their ends connected to a door and the other ends carrying rollers which are engaged in curved grooves provided in the corners of the shaft at the several floors, and devices provided in the cage for enabling an operator to throw the rollers into or out of engagement at will. These objects are attained by the mechanisms illustrated in the accompanying drawings, in which—

Figure 1 is a side elevation of an elevator shaft and cage containing my improvements. Fig. 2 is a front elevation of the same. Fig. 3 is a detached view of one of the cage-doors and its operating devices. Fig. 4 is a detail of the devices for sliding the roller-wheels carried by the levers to and from positions to be engaged in the grooves. Fig. 5 is a cross-section of one of the uprights of the shaft, showing the beltway and a portion of one of the belt cross-strips in it. Fig. 6 is a perspective view of an elevator shaft and cage provided with the improvements, but having a single cage-door; and Fig. 7 is a top view of the sliding doors and their tracks.

In the several views, A designates an elevator-shaft, in the corners of which are uprights A′.

B designates the usual cage, operated by any of the applications usual for such purposes.

C is a belt of any suitable fabric or material (such, for instance, as canvas, as shown in the drawings, or woven wire fabric) having sufficient flexibility to run over drums. The belt is passed around drums D D′ or over suitable rollers of any character at the head and bottom of the shaft, and one of its ends is attached to the top of the cage at the front and the other end to its bottom at the front. Across the face of the belt are strips *c*, whose ends slide in grooves *a*, formed in or on the uprights A′ at the corners of the shaft. These strips keep the fabric stretched laterally and afford means for guiding it in the grooves. The front of the shaft has openings at the several floors, and these openings are at all times kept closed by the belt, except that at the floor at which the cage happens to be, and thus all danger of accidents by reason of doors in the shaft being carelessly left open, as is frequently the case in elevators as ordinarily constructed, is avoided.

The cage doors *e* are preferably made in two or more sections hung on wheels *f*, that run on separate tracks *g* in the upper portion of the cage, so that the sections may slide past one another when pushed outward, as shown in Figs. 3 and 7, and slide together to occupy but small space, as shown in Fig. 2. By such arrangement the greater portion of the cage-front can be thrown open to admit passengers or freight, and in passenger-elevators required to do rapid service but little time need be consumed in filling or vacating the cage.

To operate the doors levers *h* are fulcrumed at *h′* to the front of the cage and have their upper ends connected to the outer door-sections by pins *i*, passed through long slots h^2 in the levers, and on the lower end of the levers are spindles *j*, projecting outwardly from the levers and carrying roller-wheels *k* on their ends. The wheels are attached to sleeves *k′*, having grooves k^2, and the wheels and sleeves are capable of being made to slide as well as rotate on the spindles. A rock-shaft, *l*, is hung beneath the cage-floor, and to it are attached arms *m*, to which are connected piv-